Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
2002 Biennial Review of Telecommunications	)	WT Docket No. 02-310
Regulations within the Purview of the	)	
Wireless Telecommunications Bureau	)	
	)	

Comments of RadioSoft™

RadioSoft hereby respectfully submits its comments in response to the above-referenced Docket. RadioSoft provides radio engineering software that, among other things, analyzes spectrum allocation, service and interference in all FCC and NTIA spectrum bands. RadioSoft additionally provides coordination services to many Part 90 Frequency Advisory Committees and their customers. We have as clients, among many others, all six commercial Television networks, Clear Channel, and most agencies of the United States Federal Government including the FCC itself. The gist of our comments is threefold: to ask that the Rules insofar as possible be standardized in technical areas, that they conform to the software-based analysis of Broadcast applications, and to propose certain additions to the data structures used by FCC, which have now become the *de facto* standard for more than merely regulatory purposes. Lastly we add some general requests concerning non-domestic spectrum allocation.

Standardize HAAT and Contour Methodology

Prediction of service and interference has developed differently in the different services. We propose a single standard, articulated in TIA[1] TSB-88A, for all services subject to Height Above Average Terrain (HAAT) and contour analysis above 30 MHz, with one optional modification. An excerpt (Annex G, attached) from that document is provided.

Discussion

The Rule sections at issue are found in Parts 1, 22, 24, 73, 74, 80, 90, and 101 within which there are many references to HAAT. All intend much the same method, originated by spreading topographic maps over countless floors. With the availability of Digital Elevation Models (DEMs) and computers, the fine distinctions between the various methods are largely ignored. For example, §73.313 and other sections average between 3 and 16 kilometers, while §73.684 specifies 3.2 to 16.1 kilometers, closer to the 2 to 10 mile distances from which it was derived. §101.1333 refers to HAAT without any specific Rule citation for radial extraction methodology. All these methods should be conformed and properly referenced. Phrases like "…at least 50 equally spaced points" in radial extraction should be eliminated as proposed in the TIA document, since with today's technology this number may be effortlessly varied between 50 and 2,000 so as to

[1] Telecommunications Industry Association

favor whatever is the desired aim. This sloppiness permitting differing interpretation by "dueling algorithms" serves no one.

We offer one optional simplification. While the attached TSB-88(A) Annex G is admirably specific (the undersigned was chair of the originating committee), it has failed practically in that all other committee members than the undersigned were opposed to defining two terrain databases, one for diffraction-enabled propagation and the other for HAAT[2]. The lack of a freely available DEM following the standard has left most calculations of HAAT based, as before, on 30 arc second data. Extensive measurements have shown that the difference is so minimal that for an already approximate method the disadvantages of size, standardization and availability in a higher resolution database are outweighed by the obvious advantages of a single standard thirty arc second file, which is small enough to download and is available worldwide. To press this point further, language like that is §73.625 (b)(4), which establishes methodology for DTV HAAT generation using Topographical Maps, should be eliminated, along with all similar language in other Parts. If the Commission were to define a standardized terrain database, none of this would serve even the artificial legal purpose for which they now clutter the Rules. We note that with the increasing accuracy (and concomitant complexity) of TV interference analyses like OET-69, standard contour generation is practically mandatory: it would be nearly impossible to analyze a claim based on topo-generated radials with FLR.

Standardize on NAD 83 Geographic Coordinates

Most of the Media Bureau still relies on NAD 27 coordinates. The conversion process has been attempted for over ten years, and should be effective immediately so that all other concomitant functions (population in interference areas, for one) can be similarly standardized on NAD 83. §1.924 (e) leaves one Alaskan reference in NAD27—and we note parenthetically that the first Denver Rectangle lists 1º North instead of its proper value. Moreover, §90.813 (b) *requires* NAD 27, which is silly.

Conform Rules and Software

Whether or not HAAT and contour generation are modified as proposed, the Rules defining them should conform to the software used by the Commission (and hence by everyone else).

Discussion

Contours based upon HAAT are determined according to §73.313 and §73.684 with a slide linearly plotted in decibels. Interpolation between the curves of the charts, however, is done with a bicubic (logarithmic) spline in the FCC's own software rather than log-linear, and thus all proponents of computer-generated contours, in order to match FCC, must put aside compliance with the Rules and mimic the slightly different code in use.

Rules §73.333 and §73.699 may present the printed charts and slider for approximation of contour distances (these charts, in their current smaller format, are no longer legal for extraction purposes in any case, and are otherwise out of print), but language should be

[2] It also has not been adopted by FCC nor discussed by LMCC, which is probably crucial.

inserted to the effect that the extracted locus of points from the charts and the interpolation methods now in use are controlling. Alternatively, the software could be modified so as to correctly reflect the intention of the Rules.[3] Any other course invites confusion and generates abundant fodder for lawyers.

FCC Databases

Though no specific Rule is at issue[4], we believe several fields should be added to those collected and published in CDBS (Broadcast) and ULS (Wireless) databases. Directional antennae are more and more frequently used as available spectrum shrinks. Many areas in New Jersey, for example, are now being assigned beam tilted directional patterns to reduce interference potential. Both horizontal (azimuthal) and vertical (elevation) data need to be stored in CDBS and ULS databases. Azimuths already are part of the specifications in both, but in ULS are only used in Part 22, not in Part 90 where their use is growing[5]. Coordinators are unable to take advantage of the protected spectrum unless they happen to be privy to the particular installations at issue. Beam tilted patterns also need to be correctly considered in CDBS, where many LPTV facilities on mountaintops have no protected population from the FCC's assumed horizontal elevation pattern that illuminates only other mountains instead of the valley population to which the beam tilted antenna is pointed. Since the antenna industry is not yet ready to publish three dimensional field data, we have begun assembling a general, freely available database of off-the-shelf antenna patterns that may be incorporated by reference. Use of this (or a similar) database would permit specification and storage of the best currently available data with only six fields:

Manufacturer
Model
Azimuth
Degrees of Electrical Beam Tilt
Degrees of Mechanical Beam Tilt
Azimuth of Mechanical Beam Tilt

Additionally, OET-69 will have to be amended to include calculations using these data, and the appropriate software conformed.

For the DPLMRS, FCC needs to improve its consideration of the uplink (mobile talk back) path in assigning spectrum. Many Part 90 coordinators already must deal with these issues in resolving interference complaints and in complying with the onerous Canadian protection obligations. While it is possible to locate an adjacent channel broadcast facility within its victim's service area with minimal interference, in the two way world a mobile on the adjacent channel may park (and talk) in the immediate vicinity of the uplink receive antenna, which precludes all use of the channel. For non-paired two-way channel assignments, receive frequencies should be requested, stored and published, along with CTCSS and DPL "squelch" tone assignments.

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[3] Generally, we prefer that software correctly reflect the Rules. However, this proceeding is about modifying Rules, not software, so either alternative is suggested.

[4] There are, however, Rules requiring use of ULS.

[5] We note that IRAC also would benefit from the spectrum efficiencies of improved antenna description.

Non-Domestic Spectrum

Current treaties with our neighbors (principally Canada and Mexico for services other than AM) should be available on the FCC's web site. For nighttime AM allocations, all foreign records should be labeled if they are on the "A List" or "B List"[6] and flagged as such in CDBS. Without these flags, anyone desiring accurate night studies in AM must call someone in the Commission personally to check on the current status of individual foreign stations.

Thank you for providing the opportunity to comment on your Rules.

/s
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[6] The so-called "B List" is of foreign AM stations that for various reasons do not meet the full protection standards required by international treaties. They are unfortunately numerous.

TIA TSB-88(A) Annex G (informative)

HAAT Calculation

It has been observed that the methods contained in Federal Communications Commission Regulations Part 90 (§§ 90.309(a)(4), 90.621(b)(4)(i)) can give inconsistent results for the calculation of HAAT and DHAAT, respectively. This annex is intended to be sufficiently specific that calculations made according to its principles will always yield the identical results for identical situations.

G.1 TERRAIN DATABASE

G.1.1 Terrain Database resolution

The recommended resolution for the standard database will be 3 arc seconds. Points will be specified on the intersection of the 3 second grids. Thus the point at N. Latitude 30-0-3, W. Longitude 100-0-3 will represent a tile whose corner coordinates are the following:

SE: 30-0-1.5, 100-0-1.5
NE: 30-0-4.5, 100-0-1.5
NW: 30-0-4.5, 100-0-4.5
SW: 30-0-1.5, 100-0-4.5

G.1.2 Basis and methodology for extracting values

Elevation values shall be extracted from the best available data having unrestricted distribution. In each case, where the source data is 3" or better, or, if registered to UTM (distance), 100 meters or smaller, the nearest point from the source data to the desired output intersection point shall be used. In the case where the best available source data is coarser than 3” or 100 meters, bilinear interpolation [22] of the data shall be used to derive output values.

G.1.3 Data extents

The published database will include all US States, Territories and Possessions, extended 320 km into any foreign land and ocean area around them.

G.1.4 Data format

The elevation values shall be in integral meters, and digitally published in 2 byte integer format above mean sea level in 1 x 1 degree blocks. Format may be compressed using any of the following “zip” formats: .Z, .ZIP or .GZ

G.1.5 Reissue

The standard database shall be reissued with corrections and improvements (if any) on January 1, 2003 and every two years thereafter.

G.2 HAAT DEFINITION

G.2.1 Station HAAT Definition

All terrain data intersection points within the database between 3 and 16 km are to be averaged. Points at distances of 3.0 km or greater and at 16.0 km or less will be included in the average. Points over water (lake or ocean) will be included. Points over foreign land will be included.
This method, when compared with radial averages extracted at 5 degree increments or less, will closely approximate but not exactly be equal to the average of the radial averages.

G.2.2 Radial HAAT Definition

At any single azimuth, points at 100 meter intervals will be extracted from the terrain data, beginning at 3.0 km and ending at 16.0 km, and averaged (divide by 131).

G.2.3 Station-to-Service Area HAAT Definition

Find the range of azimuths from the station of interest that barely encompass the "victim" service area. HAAT is calculated as in G.2.1, except that only points within the predetermined range of azimuths are included in the calculation.
Station-to-Service Area HAAT is intended to more accurately portray the same information that the Federal Communications Commission's directional HAAT (DHAAT) portrays.

G.2.4 Radial Point extraction method

Calculate, using Great Circle methods, the latitude and longitude of each required point, and use the closest terrain data point (no interpolation).